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Update on the US Army's Fuel Contamination Detection Efforts

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Bagram Airfield



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Bottom Line



- Documented Events
 - Discovered 15 Fuel Related Incidents
 - Undocumented incidents assumed
- Testing Requirements and Compliance
 - Deficiencies Found in both Controlled and Uncontrolled Environments
- Recommendations/Course of Action:
 - Research and test refueling equipment/modifications that can potentially detect water and particulates of any kind
 - Develop and Enforce procedures that can detect foreign material in fuel tank before Aircraft Operation
 - Detect and prevent contaminated fuel from entering aircraft



Contamination Incidents



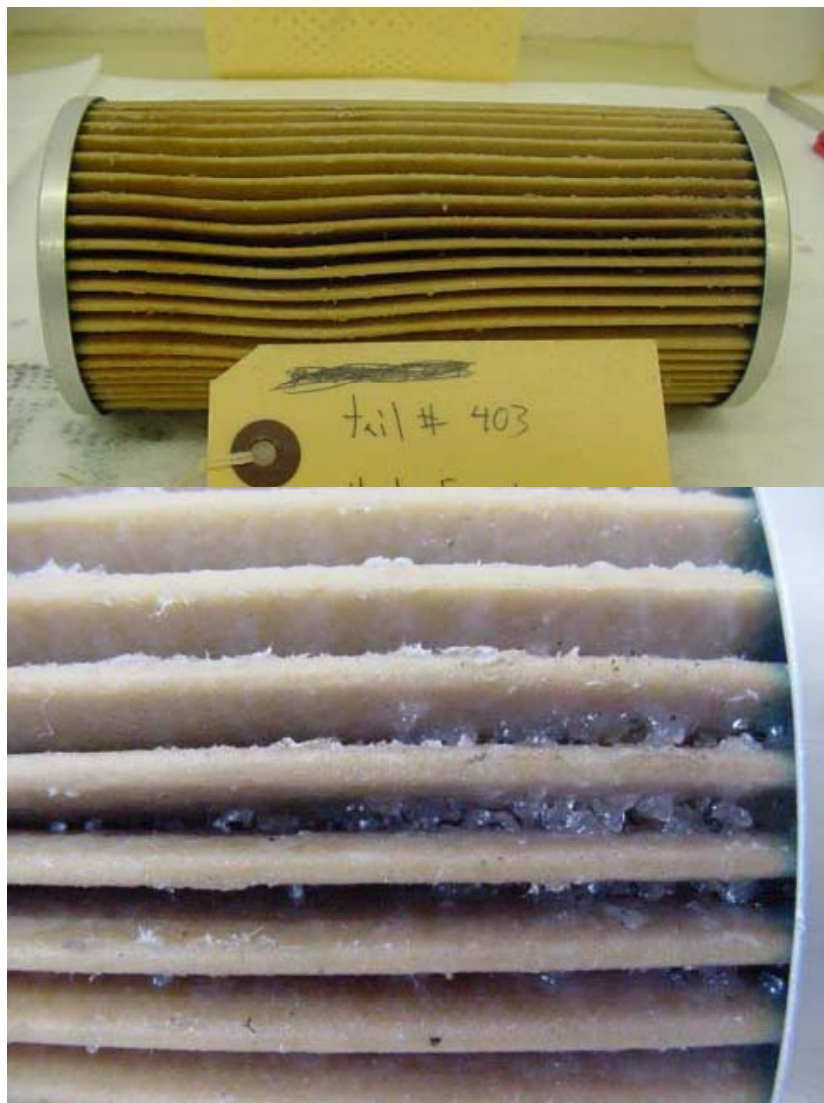
Occurrence	Date/Year	Aircraft	Remarks
1	20-Jun-05	T-37	Two T-37 USAF Refueled and Flameouts Sheppard AFB Fuel Truck Filter Failed SAP (TX)
2	21-Apr-05	UH-60L	No 1 Engine Fuel Bypass caution light illum and extinguished; Unknown cause (Farah)
3	14-Mar-06	MH-47E	Filter Contam; Boeing worked but could not identify. Early discovery of SAP (UNK)
4	18-Feb-07	MH-47E	Loss of No 2 Eng and crashed; Contam sand, dirt, fiber no metal (Afghanistan)
5	19-Sep-07	MH-47E	Duel engine flame out. Contamination Super Absorbent Polymers SAP Ft. Campbell
6	7-Nov-07	MH-47E	Fuel contam in tanks and No 1 eng filter; sand, colored flakes, and metal Ft. Campbell
7	17-Feb-08	OH-58D	Prior to takeoff, Fuel filter Bypass and acft cleared the FARP area and shutdown w/out incd
8	7-Mar-08	OH-58D	Fuel filter bypass message and landed safely - HMU replaced w/out incident
9	7-Mar-08	OH-58D	Crew refueled and immediately rec'd fuel filter bypass message. Landed changed filter
10	11-Mar-08	AH-64	Four Dutch AH-64 Contaminated with SAP in Italy
11	4-Sep-08	MH-47E	Contaminate fuel SAP discovered and cleaned out of fuel cell and engines Ft. Campbell
12	22-Sep-08	MH-47E	Reopened investigation/Contam discovered in Robertson Internal Tanks Ft. Campbell
13	7 Jan 009	UH-60M	Dual Eng flameout Contaminated with water and particulate
14	2009	C-130	USAF Jet Fuel Contamination with Fatty Acid Methyl Ester (FAME) BioFuel
15	20-Feb-09	AH-64D	No 2 eng flame out Fuel Sample contaminated, Water and Stuff in fuel Ft. Rucker

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Fuel Filter With SAP



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Summary of Incidents



- US Air Force
 - 2 - T-37 Super Absorbent Polymer
 - 1 - C-130 FAME Fatty Methyl Ester

- Foreign Military Sales
 - 4 - AH-64 Super Absorbent Polymer

- US Army
 - 1 - UH-60L/M Unknown - Water and Particulates
 - 6 - MH-47 E Particulates and Super Absorbent Polymer
 - 3 - OH-58D Unknown - Water and Particulates
 - 1 - AH-64D Unknown - Water and Particulates



Engineering Change



- Joint effort with US Navy NAVAIR to miniaturize Autogrape technology from Physical Sciences Inc., into a field portable or laboratory instrument.
- Effort performed at US Army TARDEC Fuels & Lubricants Research Facility to evaluate Velcon VCA-CV02 Portable Contaminant Analyzer, and other inline contaminate detection technologies.
- AMRDEC SBIR efforts to develop inline contaminate detection technologies.



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Portable Fuel Contamination Detector



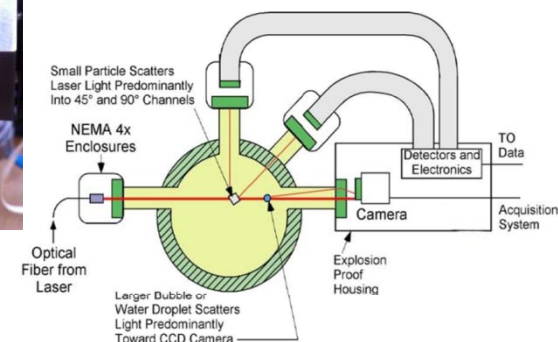
- Technology developed under the Navy SBIR program by Naval Air Systems Command's (NAVAIR) Naval Fuels & Lubes Integrated Product Team with Physical Sciences Inc.
- Independently detects Free Water (0-50ppm \pm 2ppm) and Sediment (0-20mg/l \pm 0.5mg/l)
- Navy/Army joint program, prototype to be developed, will be available in FY11.

Ground Fuels Test Kit

Free Water & Particulate (Clear and bright)

Aviation Fuel Contaminant Test Kit

Free Water (aquaGlo)
Particulate (gravimetric)



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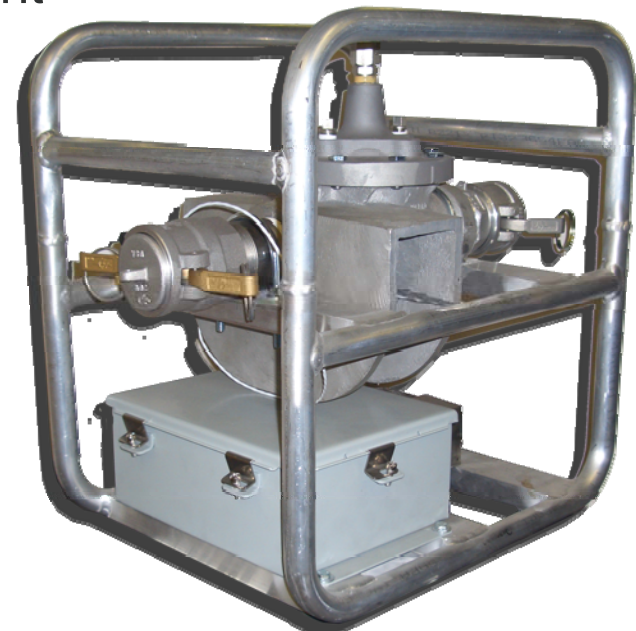
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Inline Water and Particulate Detection



- US Army TARDEC Fuels & Lubricants Research Facility at SwRI work directive to evaluate inline contaminate detection technologies.
- Velcon VCA-CV02 Portable Contaminant Analyzer.
- Parker ACM 20 particle counter
- Parker iCount particle counter
- Faudi Jet Guard sensor
- Optec turbidity sensor
- Sigrist turbidity sensor



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Phase I SBIR Efforts



- Phase I SBIRs effort jointly awarded through AMRDEC.
 - Point Source, Inc
 - Physical Optics Corporation
 - Artium Technologies, Inc
 - Progeny Systems Corporation



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